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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

K-1974

Applicant : Mitsuhiro Nishida et al.
Title : ANTIREFLECTION FILM
Serial No. : 09/837,618
Filed : April 19, 2001
Group Art Unit : 1774
Examiner : Lawrence D. Ferguson

Hon. Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

October 12, 2004

APPEAL BRIEF

Sir:

This brief is in furtherance of the Notice of Appeal, filed in this case on September 7, 2004.

The fees required under § 1.17(f) and any required petition for extension of time for filing this brief and fees therefore, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief is transmitted in triplicate.

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I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Bridgestone Corporation of 10-1, Kyobashi 1-chome, Chuo-ku, Tokyo, Japan.

II. RELATED APPEALS AND INTERFERENCES

The Appellant knows of no other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 16-19, 21, 23, 24 and 26-28 remain pending. Claims 1-15, 20, 22 and 25 have been canceled. All currently pending claims have been finally rejected. In particular, claims 16-19, 21, 23, 24 and 26-28 were rejected under 35 USC § 103 (a) as being unpatentable over Oka et al. (US Patent No. 6,335,832) in view of Glaubitt et al. (US Patent No. 6,177,131). The Appellant appeals the final rejection of claims 16-19, 21, 23, 24 and 26-28.

IV. STATUS OF AMENDMENTS

No Amendments have been filed since receiving the Final Action mailed June 23, 2004.

V. SUMMARY OF INVENTION

The present invention is directed to an antireflection film to be used for a plasma display panel, liquid crystal panel, windows of a vehicle and so on, for preventing reflection.

An antireflection film of the invention comprises an organic film (14), a hard coating layer (13) coated on the organic film, a first layer (12) or layer having high index of refraction, and a second layer (11) or layer having low index of refraction (paragraph 0044).

The first layer (12) is formed of a synthetic resin having pores (paragraph 0055) therein and metallic oxide particles contained in the synthetic resin. The metallic oxide is at least one selected from the group consisting of ZrO_2 , TiO_2 , NbO , ITO, ATO, SbO_2 , In_2O_3 , SnO_2 and ZnO (paragraph 0044). These metallic oxide particles provide high index of refraction to the first layer (12).

The synthetic resin is ultraviolet ray curable resin or electron beam curable resin (paragraph 0047).

The second layer (11) has an index of refraction lower than that of the first layer (12) and is coated on the first layer (Fig. 2). The second layer (11) partly enters into the pores to firmly bond to the first layer through the pores (paragraph 0055). In this structure, the first and second layers (12, 11) can be firmly bonded together.

The first layer (12) comprises a porous precursory layer having an index of refraction not greater than 1.64 (paragraph 0056) and the second layer (11) comprises a liquid material (paragraph 0055) coated on the porous precursory layer made integral with pores of the porous precursory layer so that when the first and second layers are integrally formed, the first layer has the index of refraction not smaller than 1.64 (paragraph 0056).

In the invention, the minimum surface reflectance of the antireflection film can be lowered to 1.5% or below by increasing the index of refraction of the first layer (12) having high index of refraction to 1.64 or more. The minimum surface reflectance of the antireflection film can be lowered to 1.0% or below by increasing the

index of refraction of the first layer (12) to 1.69 or more (paragraph 0050).

In the invention, the films or layers are formed rapidly and uniformly at low cost. The antireflection film of the present invention ensures high luminous transmittance and strong adhesion when the antireflection film is used.

VI. ISSUE

The only issue presented for consideration in this appeal is whether the Examiner erred in rejecting Claims 16-19, 21, 23, 24 and 26-28 under 35 USC § 103 (a) as being unpatentable over Oka et al. (US Patent No. 6,335,832) in view of Glaubitt et al. (US Patent No. 6,177,131).

VII. GROUPING OF CLAIMS

The claims stand or fall together, and claim 16 represents the invention.

VIII. ARGUMENT

Examiner erred in rejecting claims 16-19, 21, 23, 24 and 26-28 under 35 USC § 103 (a) as being unpatentable over Oka et al. (US Patent No. 6,335,832) in view of Glaubitt et al. (US Patent No. 6,177,131).

In paragraph 4 of the final Action, it was held that "Oka shows an antireflection film comprising a polyester organic substrate film (column 13, lines 19-32), an acrylic hard coat layer of at least 3 microns in thickness (column 13, lines 33-67), a high refractive index layer, and an acrylic resin low refractive index layer (column 26, lines 1-16 and column 42, lines 24-37) wherein the layers comprise ionizing radiation curable acrylic resin (column 13, lines 59-67)."

In column 13, lines 19-32, a transparent plastic film as the transparent plastic substrate film is disclosed. In column 13, lines

33-67, a binder resin used in a hard coat layer is explained. In column 26, lines 1-16, an antireflection sheet as shown in Figs. 15 and 16 are explained, and in column 42, lines 24-37, an organic material having a low refractive index is explained. In column 13, lines 59-67, an ionizing radiation curing resin added to the hard coat layer is explained.

Figs. 15 and 16 of Oka were explained in column 26, lines 1-16 and referred to by the Examiner, wherein a hard coat layer 23 and a layer 24 having a low refractive index are formed on a transparent substrate film 21 through an adhesive layer 22 (Fig. 15), and a layer 25 having a high refractive index is further provided between the hard coat layer 23 and the layer 24 having a low refractive index (Fig. 16).

In column 13, lines 59-67, as explained above, it is disclosed that the ionizing radiation curing resin can be added to the hard coat layer. In the invention, the first layer or high index refraction layer is ultraviolet ray curable resin or electron beam curable resin, NOT hard coating layer. Thus, the resin of the first layer is not disclosed in column 13, lines 59-67 of Oka.

What is discussed in lines 1-5 of paragraph 4 of the final Action is the simple basic structure of the invention including the organic film, hard coating layer and first and second layers. No specific structures of the invention are disclosed in Oka.

In Oka, further, an antireflection film is shown in Fig. 21, and the film has a substrate 31, a resin layer 32, an ultrafine particle layer 34 with high refractive index deposited on the resin layer 32, and an ultrafine particle layer 33 with low refractive index. The ultrafine particle layers 33, 34 are embedded in the resin layer 32. The ultrafine particles having a high refractive index include ZnO, TiO₂, CeO₂, SnO₂, ITO, and so on, and the ultrafine particles having a low refractive index include LiF, MgF₂, and so on.

In the invention, the first layer formed of the synthetic resin has pores therein. In Oka et al., although the ultrafine particle layer 34 with high refractive index is used, it is not disclosed or suggested that pores are formed in the ultrafine particle layer 34. Thus, the

first layer having the porous precursory layer of the invention is not disclosed or suggested.

In the invention, the second layer deposited on the first layer partly enters into the pores of the first layer to be firmly bonded to the first layer through the pores. In Oka, since the pores are not formed in the resin layers, the layers deposited on the high refractive index layer are simply laminated on the high refractive layers. Since the ultrafine particle layer 33 with low refractive index, i.e. not liquid material, is deposited on the ultrafine particle layer 34, the ultrafine particle layer 33 do not firmly join the ultrafine particle layer 34.

Further, in the invention, the first layer comprises a porous precursory layer having an index of refraction not greater than 1.64, and the second layer comprises a liquid material coated on the porous precursory layer made integral with pores of the porous precursory layer, wherein when the first and second layers are integrally formed, the first layer has the index of refraction not smaller than 1.64. Namely, the first and second layers can be securely bonded by the use of the liquid material as the second layer, and the index of refraction of the first layer is changed by the liquid material forming the second layer. In Oka, it is not disclosed that the layers are firmly boded by the pores, and the change of the index of refraction of the layer is not considered at all.

On page 3 of the final Action, it was held that all of the aforementioned limitations are result effective as they control the light transmittance, level of electrical conductivity, antireflectivity, refractive index, and voids of the antireflection film, and as such, they are optimizable. Forming the pores in the first layer, depositing the second layer by using the liquid material, and changing the refractive index of the first layer as stated above are not optimizable, and have patentability over the Oka.

The features of the invention are not disclosed or suggested in Oka.

In Glaubitt, a highly porous optical antireflection coating is

formed by applying a colloidal dispersion derived from hydrolytically condensing, in the presence of water and a catalyst, one or more silicon compounds of the general formula R_aSiX_{4-a} . The coating also includes colloiddally dispersed organic polymers.

In Glaubitt, the coating solution may be applied to, and dried on the surfaces to which an antireflection coating is formed, by conventional methods, and thereafter, the organic components, i.e. the organic polymers and any of the R groups present in the polycondensate are removed by heating (column 6, lines 4-28). Namely, the antireflection coating has a single layer having pores therein.

In the invention, although the first layer includes the pores, the liquid material forming the second layer partly enters the pores. Thus, the first layer includes the material for forming the second layer filled in the part of the pores. However, the coating in Glaubitt has only single layer with pores therein. The first layer of the invention is entirely different from the coating of Glaubitt. Glaubitt does not disclose or even suggest the first layer of the invention.

In case Oka and Glaubitt are combined, the material used in Glaubitt et al. may be used instead of the layer 25, 32 and so on in Oka. However, such a combination does not disclose the first layer of the present invention. In the invention, the second layer comprises the liquid material coated on the porous precursory layer made integral with the pores of the porous precursory layer. The use of the liquid material over the porous precursory layer is not disclosed or suggested in any of the cited references.

Further, the first layer comprises the porous precursory layer having an index of refraction not greater than 1.64, but when the first and second layers are integrally formed, the first layer has the index of refraction not smaller than 1.64 by receiving the liquid in the pores therein. The adjustment of the index of refraction of the first layer of the invention is not disclosed or suggested in any of the cited references.

Even if the cited references are combined, the features of the invention are not obvious from the cited references.

IX. CONCLUSION

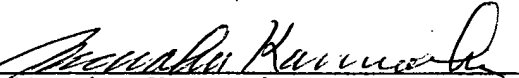
For the extensive reasons discussed above, the rejection of claims 16-19, 21, 23, 24 and 26-28 under 35 USC § 103(a) is improper and should not be sustained. Therefore, Appellant respectfully requests a reversal of the Final Rejection by the Examiner.

If for any reason this Appeal Brief is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned, Applicant's attorney of record.

Respectfully submitted,

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CLAIMS

16. An antireflection film comprising:

an organic film,

a hard coating layer coated on the organic film,

a first layer having an index of refraction and coated on the hard coating layer, said first layer being formed of a synthetic resin having pores therein and metallic oxide particles contained in the synthetic resin, said metallic oxide being at least one selected from the group consisting of ZrO_2 , TiO_2 , NbO , ITO, ATO, SbO_2 , In_2O_3 , SnO_2 and ZnO , and said synthetic resin being ultraviolet ray curable resin or electron beam curable resin, and

a second layer having an index of refraction lower than that of the first layer and coated on the first layer, said second layer partly entering into the pores to firmly bond to the first layer through the pores,

wherein said first layer comprises a porous precursory layer having an index of refraction not greater than 1.64 and said second layer comprises a liquid material coated on the porous precursory layer made integral with pores of the porous precursory layer so that when the first and second layers are integrally formed, the first layer has the index of refraction not smaller than 1.64.

17. An antireflection film as claimed in claim 16, wherein an amount of said metallic oxide particles contained in said first layer is not smaller than 70wt. %.

18. An antireflection film as claimed in claim 16, wherein sizes of said metallic oxide particles are not greater than 0.1 μm .

19. An antireflection film as claimed in claim 16, wherein said synthetic resin is acrylic resin.

21. An antireflection film as claimed in claim 16, wherein an amount of said liquid material entering into said first layer is not smaller

than 10 vol. %.

23. An antireflection film as claimed in claim 16, wherein said precursory layer becomes the first layer including air after a solvent of the precursory layer is dried or crosslinked.

24. An antireflection film as claimed in claim 23, wherein void fraction of said precursory layer is not smaller than 10vol.%.

26. An antireflection film as claimed in claim 16, wherein the index of refraction of the second layer is in a range from 1.45 to 1.51.

27. An antireflection film as claimed in claim 16, wherein said second layer includes particles which provide marring resistance and lower coefficients of friction.

28. An antireflection film as claimed in claim 27, wherein said particles in the second layer are composed of silica or fluorocarbon polymers.